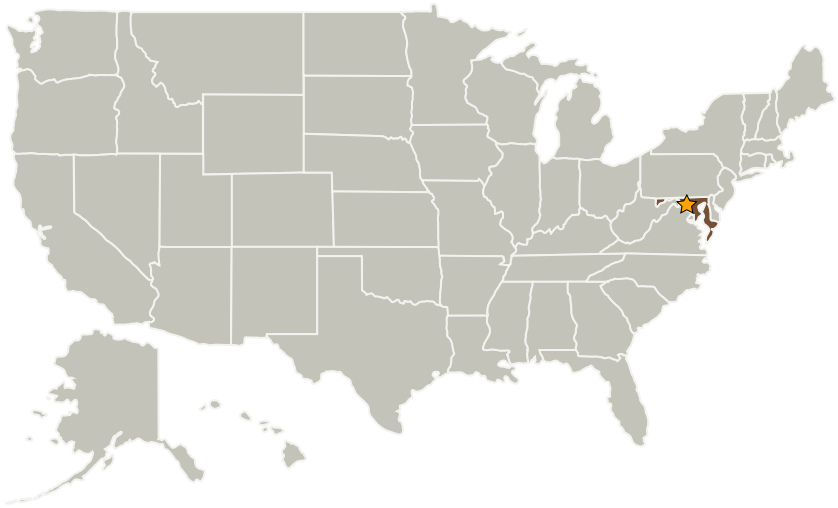
High Speed Magnetostrictive MEMS Actuated Mirror Deflectors, Phase I

Completed Technology Project (2004 - 2005)

Project Introduction

We propose to develop high speed magnetostrictive and MEMS actuators for rapidly deflecting or deforming mirrors. High speed, light-weight, low voltage beam deflectors are required for rapid tuning of lasers, airborne and ground based lidar transmitters and receivers, image correctors, scanners, printers, target acquisition and countermeasures. Technologies currently employed include, electro-mechanical actuators: piezo, galvanometric, voice-coil, etc, electro or acousto-optical devices. They suffer from some or all of following drawbacks: low speed, high voltage requirement, limited life, hysteresis, high cost and bulky connections. Recent advances in magentostrictive materials have shown that large displacements (>100mm) at high frequencies (~ 40kHz) can be achieved. Using this novel technology we will build innovative mirror systems for achieving high speed beam deflections (tens of mrad). Key attributes of these deflectors are: low voltage excitation, non-contact energy transfer, compact and rugged systems for applications in lasers, lidars and airborne systems. In Phase I after exploring optimum configurations and designs of deflectors, we will fabricate laboratory scale actuators and mirrors. The speed and deflection performance of the devices will be measured and establish their feasibility. In Phase II we will build two prototype beam deflectors and incorporate them into tunable laser and lidar receiver systems for testing.

Primary U.S. Work Locations and Key Partners



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Goddard Space Flight Center (GSFC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Goddard Space Flight Center(GSFC)	Lead Organization	NASA Center	Greenbelt, Maryland
Science and Engineering Services, Inc	Supporting Organization	Industry Small Disadvantaged Business (SDB)	Burtonsville, Maryland

Primary U.S. Work Locations
Maryland

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Coorg Prasad

Technology Areas

Primary:

- TX02 Flight Computing and Avionics
  - TX02.2 Avionics Systems and Subsystems
    - TX02.2.7 Data Reduction Hardware Systems